

on the Cooper River, I cleaned out some of the material still in the shells and submitted it to Dr. Joseph A. Cushman who found about 35 species of Foraminifera characteristic of the Eocene, Cooper Marl, thus definitely determining the age of this formation.

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### “LIGGING” IN THE EVERGLADES OF FLORIDA

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With very few exceptions, the collector of arboreal mollusks has more thrills crowded into one hour of good hunting than a general collecting trip will yield him in a week. To locate a hammock containing a colony of *Liguus* is to reach a high spot in collecting that has but few equals.

Such was our good fortune during the past winter. I prevailed upon W. E. Schevill, a fossil hunter, to drop his antiquities long enough to enjoy a bit of modern zoology in the land of sunshine and mosquitoes. The Museum truck was at our disposal and equipped with our camping duffle we set out from Cambridge headed for Florida on Feb. 9th, in a delightful New England sleet and snow storm.

Noon of the following day we stopped at the Academy of Natural Sciences in Philadelphia to see Dr. Pilsbry. Since the Pinchot trip, Dr. Pilsbry has scarcely been on speaking terms with me. After all, a seven months' expedition to the South Seas is pretty tony, and my ravings of the Tennessee and Georgia trips I had previously made left him rather cold. Fortune was with us. The day was cloudy and the worst part of winter was still ahead—and that's a lot of grief for anyone living in Philadelphia. We rubbed it in. The joy of collecting in new country, warm weather and old clothes, have more than ordinary appeal for the Chief, and we handed it to him. At the end of an hour's talk we could detect real envy, and considering the books partially balanced we left for Washington and beyond.

Four days of good roads, warmer weather and car trouble saw us entrenched at the home of Dr. Fairchild in Coconut Grove. Here we were able to outfit more completely for our camping trip and enjoy a few days of delightful hospitality on Biscayne Bay before entering the Everglades.

Our original plans had called for a boat trip through the 'glades from Pinecrest south to Long Pine Key. However, the water was too low for such transportation and we decided to go to Long Pine Key, which was but imperfectly known. This is an area a little west of Royal Palm State Park. It is composed of glades alternating with pine ridges or islands. A new road eight miles long has been constructed running west across about half the length of the key, and we were to work the territory along this road. A few tomato growers farming the glades are engaged in a rather precarious livelihood, and from what we saw and learned, the plowing must be done with a motor boat! When we arrived the country was fairly dry, though several hammocks, especially south of the road, had to be reached by wading in water six inches to a foot in depth.

Through the courtesy of Mr. Frank van Marlen, the manager of the park, permission was granted us to camp near the park lodge. From here we could drive out each morning to our collecting grounds leaving our camp set up.

As stated above, only a few hammocks in this region had been investigated. Most of these were near the road and readily accessible by walking up the glades. Our introduction to these hammocks proved them to be far richer than we had hoped and altogether too good to be enjoyed alone, so letters were sent to Dr. Pilsbry and Mr. Goodrich to join the party. Mr. Goodrich found it impossible to come, but Dr. Pilsbry telegraphed that he would be with us as soon as the southbound train could carry him. He never told me what excuse he gave the powers that be in Philadelphia for going to Florida in mid-winter. I find it exceedingly difficult to explain why the best "lig" collecting is to be found during the height of the gay season!! Tsk! Tsk!

By the time Dr. Pilsbry had arrived we had amassed a

sizable fortune in *Liguus*, and during the auto drive from Homestead to camp, vivid stories of collecting were detailed at length.

We had made arrangements for Dr. Pilsbry to sleep at the lodge but to have his meals with us, as our particular type of tent could only accommodate two people. This arrangement worked splendidly for all hands.

Hammocks, as these thickets of broad-leaved trees are called, were found everywhere: in the pine woods, the open glades or on the edge of both the pine land and glades. In general they were quite alike other than in size. The flora of the hammocks is essentially West Indian, with the *Ficus*, *Lysiloma*, *Bursera* abundant and with them hosts of other plants unknown to us. The best trees for *Liguus* in this region were the *Lysilomas*, and wherever these trees were found the "ligs" were sure to be found as well. At this season the leaves of the *Lysilomas* are dark red and this color could be seen for some distance. This aided materially in locating "lig" hammocks, as their colors ordinarily blend with the greens of the pine woods. The story of each day is much the same. Each daily trip had, of course, its own delight in locating different color forms or colonies of *Liguus* that differed in some way from all others that we had seen.

One Sunday Richard Deckert and Henry Frampton of Miami came down and we all started out on our longest single tramp, penetrating the 'glades six miles north of the road. This trip yielded three pure races of *Liguus*, namely *L. fasciatus luteus* Simp., *L. f. castaneozonatus* Pils. and *L. f. cingulatus* Simp., each in a single isolated hammock in the everglade. It is the occurrence of these pure colonies that show the fixity of these color forms as Mendelian segregants.

On two other occasions Paul McGinty and his sons Paul and Tom from Boynton spent the day collecting with us. Maxwell Smith was with the McGintys on their first trip and that day we drove to the end of the road and then tramped due west for nearly two miles to visit two large hammocks. The first contained several large royal palms but the hammock growth in general was so dense that *Liguus* were rather

difficult to find. Charles Mosier made several trips with us and directed us as well to many hammocks that possessed some fine material. Dr. and Mrs. DeBoe of Miami, friends of Dr. Pilsbry and also ardent "lig hunters", drove down for collecting two or three times during our stay. Their trips were made independent of ours but we had the pleasure of comparing notes and exhibiting material that had been collected during the day.

Through a photographer in Miami we had made a series of aerial photographs of our section of the Key. The day the photos were made was a good "flying day" though not so good for photography. Sufficient haze existed to limit materially the height at which pictures could be made and consequently the pictures did not exhibit enough detail to locate many hammocks more than a mile or so from the road. The road had to be included in the pictures to serve as a guide, as this flat country offers but little by way of landmarks. The pictures covered, roughly, a strip about ten miles long, two miles beyond the limit of the eight-mile road. We were able to scale the pictures to distances on the road and readily locate any hammocks that were noted in the photos.

Hammocks could be located blindly by just walking through the pine woods, but this is slow and tiresome work as walking is exceedingly difficult over the rough limestone rock which is pitted with holes and always badly weathered.

Fortunately for us, rattlesnakes were rare in this region. Only four were encountered, three of which we managed to capture, but not alive! It is quite disconcerting to have your eyes focused on a *Liguus* a few feet away and then be suddenly alarmed by the "buzzing" of a rattler. According to popular belief, a rattler always rattles when disturbed, but *Crotalus* No. 3 failed to do so even when being walked over, around and almost upon—if two inches can be called close enough to be considered a disturbance.

Mosquitoes were very rare until the last week and then they became quite abundant, enough so that supper usually consisted in part of setting up exercises. Also a very large Tabanid fly appeared during the last week. It's buzz could

be heard fifty feet away. Visions of the northern "green head" came to mind, and if the bite of these fellows was at all in proportion to their size it must be equal to that of a dog. Fortunately their approach was heralded by so much noise that full preparations could be made to drive them away or else kill them after they landed and before they had managed to find suitable territory to puncture.

It is unfortunate to record that this area as well as others in the Everglade region is being rapidly destroyed. Drainage and fire are fast despoiling a unique territory. Unless steps are soon taken to preserve it, little will remain of the original fauna and flora.

Attempts are now being made to make this section of Florida into a National Park. If this project succeeds a remarkable area will be held for the benefit of future generations, an area that has no parallel for its kind anywhere else in the world. As a wild life preserve, especially for birds, it probably has no equal in the United States, as its interior is so inaccessible, without roads, that natural conditions would prevail indefinitely.

There is an appeal for the naturalist in this country that cannot readily be described. I suppose that it is so totally different from most country that many of us have seen or lived in that it intrigues our interest. For all of its flatness, it is a region of strong contrasts. The open glades or prairies, the pine woods and the hammocks are sharply defined. A plant ecologist could find problems for a life's work in any square mile on the Key. The evolution of a hammock can be seen from a unit measure of a two-foot willow tree in a small sink hole to that of Paradise hammock, a square mile in area with several hundred species of plants. To the malacologist it leaves little to be desired. Problems of speciation in the color forms of *Liguus*, methods of dispersal, adaptation, local distribution and life histories offer a multitude of studies.

We had noted numerous empty shells of *Ampullaria paludosa* Say on the canal banks near camp. No live snails had been seen in the canal though a few had been found in the solution or sink holes in the glades. One night rather late,

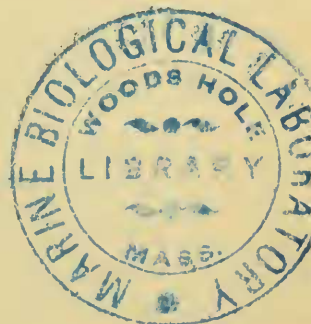
after a feast of grapefruit we proceeded to the canal with the flashlight to wash up. A pair of live *Ampullaria* were found slowly crawling along the bank. Investigation of two hundred feet of canal yielded over 100 specimens. During the day this mollusk had been buried in the mud and algae in the deep water of the canal. At night, protected by darkness, it could feed at leisure along the bank. The presence of many large birds that feed on them has probably been a factor in producing this habit. Elsewhere in Florida these snails have been easily found during the daytime.

*Ampullaria* must be an important food item for many birds if their dead shells can be considered an index. Lang<sup>1</sup> has published an account of the feeding habits of *Rostrhamus sociabilis*, the Everglades Kite on *Ampullaria* in British Guiana and in all probability the same thing occurs with the kites in the Everglades. *Planorbis intercalaris* Pils. must as well offer an abundant food supply for birds as it is very common in many sections of the open glades.

After five successful weeks we drove to Miami, Schevill and I returning directly by boat to New York. Dr. Pilsbry remained over a few days with relatives in Coconut Grove.

There is much country still unknown and we have hopes that in the future more trips can be made for *Liguus* exploration. Frankly, "ligitis" is a serious malady and when once infected a complete cure is impossible. It is seasonal and has a definite periodicity concurrent with the drying up of the glades, the disappearance of the mosquitoes and the first heavy snow storm in the north.

<sup>1</sup> Lang, H. NAUTILUS 37; pp. 73-77, 1924.



RUGANODONTITES, A NEW SUBGENUS OF SOUTH AMERICAN  
PEARLY, FRESH-WATER MUSSELS

BY WILLIAM B. MARSHALL  
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The shells of the genus *Anodontites*, to which this new subgenus belongs, have no hinge teeth, practically no beak sculpture, and but few other characters which can be used for classifying them into groups. The surface sculpture seems to offer one means of dividing them into subgenera or sections, and it is this feature which has been used in defining the new subgenus *Ruganodontites*. Notes are added hereto relating to the minute radial sculpture found on many South American and African Naiades.

RUGANODONTITES, new subgenus of ANODONTITES.

Shell elongate, thick, usually somewhat falcate, with a broad, shallow depression running from the beaks to the middle of the ventral margin. Periostracum thick, microscopically radiately striate, much puckered and wrinkled as if from shrivelling, the wrinkling occurring also in the calcareous portion of the shell. The wrinkles are obscurely divided into narrow, gradually widening rays extending from the beaks to the margin. Nacre greenish-livid. Type *Anodontites colombiensis* Marshall.

1921 *Anodontites colombiensis* Marshall (Proc. U. S. Nat. Mus. Vol. 61, art. 16, No. 2437, p. 7, pl. 1, fig. 5; pl. 2, figs. 13, 14; pl. 3, figs. 5, 13, 14).

1921 *Anodontites crispata* Ortmann (Mem. Carnegie Museum, VIII, p. 589, pl. 40, figs. 7, 8; pl. 41, figs. 2, 3). Not *Anodontites crispata* Bruguière, 1792.

*Type locality*: Rio Colorado, Province of Santander, Republic of Colombia. The Colorado is in the Caribbean drainage system. It is tributary to the Rio Magdalena and lies on the western slope of the Cordillera Oriental. High mountains separate the Magdalena and its tributaries from the great areas drained by the Orinoco and Amazon River systems.